

REMARKS

The abstract was objected to for using the words "present invention", "improved", and "The invention discloses". The abstract has been amended to remove these words.

Claim Rejections - 35 USC 103

Claims 1-3 and 5 were rejected under 35 USC 103(a) as being unpatentable over Akram et al., US Patent 5,739,585 (hereafter Akram) in view of Lim et al., US Patent 6,020,221 (hereafter Lim). The Examiner stated

In regards to claims 1 and 2, Akram et al. disclose (col. 4, lines 4-30 and FIG. 1) a packaged integrated device consisting of a substrate having a recessed central region, surrounded by a raised perimeter, the central region and the perimeter being formed together from the same material. The central region also has a die mounting location in which an integrated circuit device can be flipped and mounted face down. While Akram et al. fail to teach how the integrated device is electrically connected to the substrate, Lim et al. illustrate (FIG. 8) a semiconductor substrate having a plurality of contacts in the central region in which an integrated circuit device formed with contacts on a top surface, flipped and placed against the central region of the substrate making contact with the contacts of the central region of the substrate. Lim et al. also teach (col. 3, lines 36-52; col. 5, lines 32-42) a method of connecting an integrated circuit device to a substrate in which the method includes electrically connecting the contacts of the central region of the substrate to solder balls on an external surface of the packaged integrated circuit device. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to package an integrated circuit device on a substrate as disclosed by Akram et al. and connect it electrically to the substrate as disclosed by Lim et al., since such a package reduces the warpage and stress caused during the assembly process and further increases the reliability and yield of the packaged devices.

The above analysis of the Examiner is traversed. Akram teaches away from Applicant's claimed combination by showing an opening in the lower surface of the package and something labeled 32 but not discussed by Akram that appears to be wire bonds. The Lim Structure is just another example of what Applicant shows in prior art Fig. 1. Neither Akram nor Lim show or suggest a structure in which electrical contacts have been recessed in a cavity. For clarity, Applicant has amended Claim 1 to inserted

the word "recessed" before "central region" at every occurrence, not just the first occurrence. Neither Akram nor Lim suggest or disclose the claimed

"the recessed central region having a plurality of contacts for providing electrical connection from conductors external to the substrate to an integrated circuit device".

recited in Applicant's Claim 1. The Examiner's conclusion that

it would have been obvious to one of ordinary skill in the art at the time the invention was made to package an integrated circuit device on a substrate as disclosed by Akram et al. and connect it electrically to the substrate as disclosed by Lim et al.

is traversed, in particular because the Examiner has used hindsight reasoning to make Applicant's combination. There is no suggestion in either Akram or Lim to make the claimed combination. The fact that the claimed combination achieves Applicant's objective recited by the Examiner as

since such a package reduces the warpage and stress caused during the assembly process and further increases the reliability and yield of the packaged devices.

does not suggest that the prior art provides motivation for making the claimed combination.

It is respectfully submitted that the Office Action has impermissibly used the teachings of the specification as a roadmap for the proposed combinations. Earlier this year, the Federal Circuit reiterated that requirement in In re Lee, Slip Opinion 00-1158 (Fed. Cir., January 18, 2002), when the Federal Circuit held that:

"The factual inquiry whether to combine references must be thorough and searching." Id. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1124-25, 56 USPQ2d

1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'") (quoting C.R. Bard, Inc., v. M3 Systems, Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232 (Fed. Cir. 1998)); In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); In re Dance, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is some suggestion or incentive to do so.") (emphasis in original) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)).

It is respectfully requested that, should the alleged "motivation" be maintained, the next Office Action provide evidence to support its allegation of obviousness, as required by controlling patent law.

Dependent Claims 2-9 are believed to distinguish over the references for at least the reasons of Claim 1 from which they depend.

Claims 10-12 were rejected under 35 USC 103(a) as being unpatentable over Akram in view of Lim and further in view of Malladi. US Patent 5,939,782. Independent Claim 10 recites, in part,

a recessed central region having a plurality of contacts for providing electrical contact to an integrated circuit device

and thus Claim 10 distinguishes over the references for the reasons already discussed. Claims 11 and 12 depend from Claim 10 and are believed to distinguish over the references for at least the same reasons.

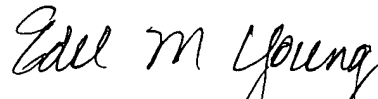
Applicant requests that the Examiner reconsider and withdraw the Rejections, and allow Claims 1-12.

CONCLUSION

In light of the above amendments and remarks, it is believed that the Application, including Claims 1-12, is in condition for allowance, and Applicant requests allowance.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page(s) is/are captioned "Version with markings to show changes made."

Respectfully submitted,

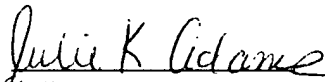


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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D. C. 20231, on April 29, 2002.

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Signature

VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

ABSTRACT

The Abstract is amended as follows:

[The present invention provides an improved] A semiconductor flipchip package [that] includes a central cavity area on the first major side for receiving a flipchip die therein. The package substrate is substantially made from a single material that serves as the support and stiffener and provides within the cavity floor all the connecting points for flipchip interconnection to the silicon die. The integral cavity wall serves as a stiffener member of the package and provides the required mechanical stability of the whole arrangement without the need for a separate stiffener material to be adhesively attached. The cavity walls may contain extra routing metallization to create bypass capacitors to enhance electrical performance. [The invention discloses optional] Optional methods to cover the silicon die [to] enhance thermal performance of the package.

CLAIMS

Claims 1, 2, and 5 are amended as follows:

1. (amended) A packaged integrated circuit device comprising:

a substrate having a recessed central region surrounded by a raised perimeter, the recessed central region and the perimeter being formed together from the same material, the recessed central region having a plurality of contacts for providing electrical connection from conductors external to the substrate to an integrated circuit device; and

an integrated circuit device formed with contacts on a top surface, flipped, and placed against the recessed central region of the substrate such that the contacts of the integrated circuit

device meet the contacts of the recessed central region of the substrate.

2. (amended) The packaged integrated circuit device of Claim 1 wherein the contacts of the recessed central region of the substrate are electrically connected to solder balls on an external surface of the packaged integrated circuit device.

5. (amended) The packaged integrated circuit device of Claim 1 wherein the contacts of the recessed central region of the substrate comprise solder bumps.